

# THE NORTH AMERICAN ICHNEUMON-FLIES OF THE TRIBE ACOENTINI.

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## INTRODUCTION.

This paper is a revision of the tribe Acoentini as defined by Cushman and Rohwer<sup>1</sup> and as represented in the North American fauna. Of the five genera included only two, *Coleocentrus* Gravenhorst and *Arotes* Gravenhorst, are known to occur in our region and only these two are treated at length, though all five are tabulated in the key to genera. *Coleocentrus* has been revised by the senior author and *Arotes* by the junior author, and new species should be ascribed to the individual responsible for the descriptions.

The present study is based on examination of all the available types of described North American species of *Coleocentrus* and *Arotes* and the rather extensive representation of these two genera in the collection of the United States National Museum, together with specimens of the genotypes of all three of the extralimital genera.

The illustrations used in this paper were made from drawings prepared under the writers' supervision by Miss Mary Carmody, formerly of the branch of Forest Insects, Bureau of Entomology.

### Tribe ACOENTINI Cushman and Rohwer.

The members of this tribe are medium-sized to large insects chiefly remarkable for the extreme vomeriform hypopygidium in the female. In this respect they are distinct from all other Ichneumonidae. Aside from this the tribe is rather closely allied to the more typical ichneumonine tribes Rhyssini, Xoridini, etc.

The members of this tribe, so far as their host-relations are known, are parasitic on wood-boring coleopterous, hymenopterous, and lepidopterous larvae.

*Tribal characters.*—Head transverse, broad behind eyes; eyes not emarginate within, parallel or nearly; malar space distinct; mandibles bidentate apically, teeth subequal; occipital carina complete; scutum longer than the propodeum, but not especially lengthened, never

<sup>1</sup> Proc. U. S. Nat. Mus., vol. 57, 1920, p. 395.

transversely rugose; scutellum convex, not margined laterally; mesepisternum not especially lengthened; legs rather long, none of the parts especially robust, posterior femora not dentate; abdomen polished, without elevations or furrows, petiolate to subsessile, compressed apically; hypopygidium in female large, vomeriform; ovipositor long, compressed or subcompressed, acute at apex with a more or less distinct dorsal angulation some distance back from apex, lancets enclosing lance laterally at extreme apex.

## KEY TO THE HOLARCTIC GENERA.

1. Propodeal spiracle round or long oval and placed near base of segment; last joint of hind tarsus distinctly shorter than second; apical tergite elongate, prominent, and more or less trowel-shaped; clypeus distinctly separated from face medially; malar furrow obsolete; front and middle claws simple; nervellus strongly reclivous, broken far above middle.....*Coleocentrus* Gravenhorst.  
Propodeal spiracle long oval or slit-like and placed at about the middle; last joint of hind tarsus distinctly longer than second; apical tergite not elongate; clypeus usually not distinctly separated from face medially; malar furrow distinct; front and middle claws usually finely bidentate at apex; nervellus perpendicular or slightly reclivous, broken at or not far above middle.....2.
2. Abdomen very narrowly petiolate, first tergite much more than twice as long as wide at apex, the spiracles at about the middle; second recurrent vein antefurcal or interstitial; front wings usually more or less infumate at apex; entire body pale or contrastingly colored in black and yellow or whitish; antennae long and slender, usually annulated.....*Arotes* Gravenhorst.  
Abdomen rarely petiolate, and if so the spiracles of 1st tergite are far before middle; if spiracles are in the middle the tergite is much broader; second recurrent post-furcal; front wings immaculate; head and thorax immaculate black, abdomen unicolor or bicolored black and rufous; antennae short and stout, not annulated...3.
3. Wings with an areolet; front and middle claw simple; clypeus broadly subtruncate and reflexed at apex, without a median tooth or angle; malar space little more than half as long as basal width of mandible; sternauli practically absent; notauli deep and meeting before the scutellum; propodeal carinae weak.  
*Mesoclistus* Foerster.  
Wings without areolet; front and middle claws bidentate at apex; clypeus truncate and at least angulate medially; malar space nearly or quite as long as basal width of mandible; sternauli well defined.....4.
4. Notauli very weak, scarcely at all impressed; propodeal carinae weak; prepectal carina weak and terminating low down on pleura; first tergite nearly or quite as wide at apex as long, the spiracles nearly in the middle..*Acoenites* Latreille.  
Notauli strong and complete, meeting some distance before scutellum; propodeal carinae strong; prepectal carina very strong and reaching nearly to dorsal margin of pleura; first tergite nearly or twice quite as long as wide at apex, the spiracles distinctly before the middle....*Phaenolobus* Foerster (= *Chorischizus* Foerster).

## Genus COLEOCENTRUS Gravenhorst.

*Coleocentrus* GRAVENHORST, Ichn. Eur., vol. 3, 1829, p. 437. *Genotype*.—*Ichneumon excitator* Poda.

From all the other genera of the tribe this genus differs in the basal position of the propodeal spiracle, the short apical joint of the hind tarsus, the long terminal tergite, and the obsolete malar furrow.

*Biological habits.*—The members of this genus are parasitic on wood-borers, both hymenopterous and coleopterous.

*Generic characters.*—Head transverse, not especially widened behind the eyes; clypeus distinctly separated, inflexed at apex, with a median tooth; malar space rather long; face flat; eyes and ocelli moderate; antennae about two-thirds as long as body, filiform, attenuate apically. Thorax stout, oblong, weakly arched above; notauli deep, complete, meeting on disk of mesoscutum, prescutum prominent; prepectal carina nearly obsolete except briefly below; propodeum with more or less distinct apical, median, and lateral carinae, spiracle placed much before middle, long oval to nearly round; areolet, when present, oblique trapezoidal and petiolate, frequently absent; legs, especially posterior, long and rather slender, with hind basitarsus fully as long as remaining joints combined, apical joint much shorter than second, claws simple. Abdomen clavate;

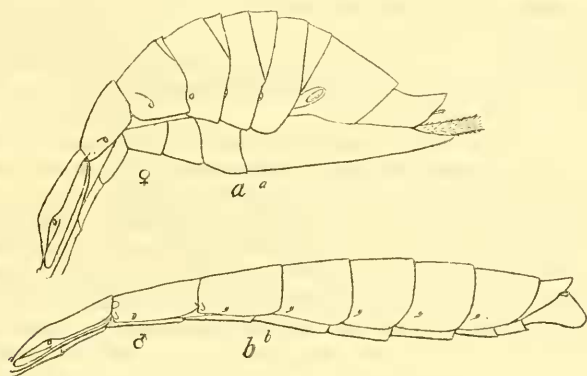


FIG. 1.—COLEOCENTRUS OCCIDENTALIS. SIDE VIEW OF ABDOMEN; a, FEMALE; b, MALE.

first tergite with spiracle much before middle; dorsal carinae developed only at base; last tergite long and scoop-like or trowel-shaped; last abdominal spiracle in female very large oval; ovipositor usually slightly shorter than body, occasionally as long, and strongly compressed.

The male is much less robust than the female, especially in the abdomen, which is slender throughout; the face, scape, and front and middle legs are paler than in the female; the sheaths of the genitalia are very large and obliquely truncate at apex; the last abdominal spiracle is normal.

*Specific characters.*—The most conspicuous specific characters are found in the color and color pattern of the body, the presence or absence of the areolet in the front wing; the form of the clypeus; the color of the wings and legs, especially the coxae and hind tarsi; the form of the propodeal spiracle; the comparative proportions of the first tergite; and the size of the ocelli. This set of characters serves to

separate the twelve known North American species, and are the characters used in the following key:

## KEY TO SPECIES.

1. Antennae banded with white; head entirely black (male) *mellipes* Provancher.  
Antennae unicolorous; face, at least in male, with yellow markings.....2.
2. Areolet wanting.....3.  
Arolet present.....5.
3. Face rugose; palpi and tegulae yellow; ovipositor longer than body.  
*flavipes* (Provancher).  
Face smooth; palpi and tegulae, the latter at least apically, piceous; ovipositor shorter than body.....4.
4. Wings hyaline; clypeus so sharply inflexed as to appear truncate, with the median tooth very small.....*minor* Cushman.  
Wings yellowish; clypeus less sharply inflexed, with the median tooth broad and obtuse.....*niger* Cushman.
5. Thorax black.....6.  
Thorax reddish brown.....10.
6. Coxae in female entirely red; abdomen black with tergites whitish at apices; male unknown.....*harringtoni* Cushman.  
Coxae black or piceous at least basally within (in male front and middle coxae pale at apex, occasionally entirely pale and rarely the hind coxae are entirely red).....7.
7. Abdomen more or less red; all coxae in female dark piceous red, blackish at base (in male the red is paler and the piceous more nearly black and the hind coxae sometimes uniformly piceous); face in female usually maculate with yellowish, in male yellow but with clypeus black; tegulae reddish....*occidentalis* Cresson.  
Abdomen usually entirely black (in known male, more or less piceous red in middle) or with apical tergites white margined; all coxae in female and in known male black; both face and clypeus in known male yellow.....8.
8. Inner orbits, tegulae and a spot in front, and stigma reddish; apical tergites margined with whitish; ovipositor longer than body. (Male not known.)  
*quebecensis* Provancher.  
Head in female entirely black; stigma except at base blackish; abdomen black, occasionally piceous red in middle, tergites not margined with whitish; ovipositor shorter than body.....9.
9. Malar space in female barely two-thirds, in male less than half as long, as basal width of mandible; wings distinctly suffused with yellowish, especially basally; areolet with petiole barely half as long as free portion of first intercubitus; legs pale stramineo-testaceous, hind tibiae nearly black.....*pettiti* Cresson.  
Malar space in female nearly, in male fully, half as long as basal width of mandible; wings infumate, not yellowish basally; areolet with petiole nearly as long as free portion of first intercubitus; legs dark rufo-testaceous, hind tibiae but little darker than femora.....*manni* Cushman.
10. Wings very dark brownish with purplish reflections; hind tarsus not much paler than tibia, latter not black apically; malar space much shorter than basal width of mandibles; membraneous apical portion of tergites darker than chitinized portion. (Female only).....*pulchripennis* Cushman.  
Wings subhyaline; hind tarsus yellow, tibia infuscated at apex; malar space but little shorter than basal width of mandible; membraneous portion of tergites paler than chitinized portion.....11.



11. Propodeal spiracle nearly circular; first tergite much more than half as wide at apex as long, and not deeply impressed on each side near apex; diameter of lateral ocellus fully two-thirds as long as ocellular line; vertex and frons black. (Female only).....*rufus* Provancher.  
 Propodeal spiracle elongate oval; first tergite barely half as wide at apex as long and deeply impressed on each side near apex; diameter of lateral ocellus little more than half as long as ocellular line; vertex and frons not black. .*similis* Cushman.

COLEOCENTRUS MELLIPES Provancher.

*Coleocentrus mellipes* PROVANCHER, Addit. Faun. Ent. Can., Hym., 1889, p. 113, male.

Discussion based on original descriptions.

During his visit to Quebec for the examination of the Provancher types, Mr. Rohwer was unable to find the type of this species, nor is it listed in Provancher's manuscript catalogue. I am of the opinion that it is not a *Colcocentrus*, the banded antennae, immaculate head, and almost entire lack of propodeal carinae distinguishing it from any other species of the genus. I can not, however, definitely place it from the description and retain it in the present genus provisionally. The banded antennae suggest such genera as *Echithrus*, *Exetastes*, *Arotos*, and *Xorides*, but other characters mentioned in the description exclude it from any of those genera.

COLEOCENTRUS FLAVIPES (Provancher).

*Acoenites flavipes* PROVANCHER, Nat. Can., vol. 6, 1874, p. 80, female. Type.—  
 Dernière Prov. Coll., Public Mus., Quebec. Yellow label 1249.

*Acoenites canadensis* PROVANCHER, Nat. Can., vol. 12, 1880, p. 10, male. Type.—  
 Dernière Prov. Coll., Public Mus., Quebec. Yellow label 375.

Discussion based on original description and notes by Mr. Rohwer on types.

The lack of the areolet led to the description of this species in *Acoenites* and the failure to understand the sexual antigeny to the redescription in the male. Mr. Rohwer, who examined the types, considers *canadensis* as most certainly the male of *flavipes*.

Mr. Rohwer's notes contain the following:

Runs to *Coleocentrus* and agrees in all characters except the absence of the areolet; also agrees in habitus. It will not fit any other genus in the table. Clypeus truncate with a very small median tooth. In size it is very like *C. similis* Cushman (Type). Other than the color and absence of areolet only the following differences are noted; clypeus more truncate; longitudinal carinae on propodeum more widely separated; first tergite with the longitudinal depression a trifle deeper, and the ovipositor a trifle longer.

The rugosity of the face, credited to this species by Provancher, is, if present, certainly very curious for this genus. Mr. Rohwer made no note on this point.

COLEOCENTRUS MINOR Cushman, new species.

Evidently closely allied to *flavipes* (Provancher) from which the smooth face, piceous palpi and tegulae, and shorter ovipositor readily distinguish it.

*Female*.—Length, 15 mm.; antennae (entire flagellum of both missing); ovipositor, 11 mm.

Head polished, impunctate, temples weakly convex, strongly sloping; face three-fourths as long as wide; clypeus so sharply inflexed that it appears truncate, the median tooth very small; malar space slightly shorter than basal width of mandible; diameter of lateral ocellus less than postocellar line, which is about three-fourths as long as ocell-ocular line. Thorax polished, more or less obscurely sculptured laterally and ventrally, especially on pronotum; propodeum nearly as long as depth of propodeum and metapleura, coriaceously roughened, with the petiolar area sharply separated and highly polished, longitudinal carinae weak, spiracles broad oval; areolet lacking. Abdomen a half longer than head and thorax, sculpture granular, more or less striate basally and subpolished apically; first tergite three-fifths as wide at apex as long and about a third longer than second; hypopygidium fully half as long as abdomen.

Piceous black; head immaculate, but with faint paler piceous reflections above clypeus; palpi and underside of scape and pedicel fusco-piceous; legs pale testaceous, hind femur at apex, tibia, tarsus, and apical joints of middle tarsus fuscous; tegulae white, piceous at apex; wings hyaline, veins and stigma fuscous, latter white at base; abdomen somewhat paler than thorax except at tip.

*Type locality*.—Pisgah Ridge, North Carolina.

*Type*.—Cat. No. 20773, U.S.N.M.

One female under Hopkins U. S. No. 3558, which number refers to a note by W. F. Fiske recording it as having been reared, May 26, 1905, as a parasite of a cerambycid (*Leptura* ?) in a dead branch of *Viburnum*.

**COLEOCENTRUS NIGER** Cushman, new species.

Allied in its lack of an areolet to *minor* Cushman, but in general habitus, length of propodeum, and clypeus more closely allied to *harringtoni* Cushman.

*Female*.—Length, 18 mm.; antennae (flagella missing); ovipositor, 13 mm.

Head very delicately shagreened, subpolished; face two-thirds as long as wide, shallowly impressed each side of middle; clypeus moderately inflexed, tooth broad and obtuse; malar space slightly shorter than basal width of mandible; frons arcuately striate; temples flat, sharply sloping; diameter of lateral ocellus nearly as long as postocellar line, which is about two-thirds as long as ocellocular line. Thorax coriaceous, subpolished, mesoscutum nearly smooth; propodeum much shorter than depth of combined propodeum and metapleura, petiolar area very short, more or less longitudinally rugose, sharply separated, longitudinal carinae subobsolete, spiral broadly oval. Abdomen two-thirds longer than head and thorax,

finely granular, coriaceous basally, subpolished apically; first tergite fully two-thirds as wide as long and barely a half longer than second; hypopygidium slightly less than half as long as abdomen.

Black with piceous reflections on head and abdomen; clypeus at apex, supraclypeal spot on each side of face, scape and pedicel below piceous; palpi fuscous; tegulae pale piceous; wing yellowish, veins and stigma dark, latter whitish at base; legs testaceous, hind tibiae and all tarsi more or less infuscate; tergites beyond third with membranous apical portion whitish.

*Type locality*.—Whitefish Point, Michigan.

*Type*.—Cat. No. 21193, U.S.N.M.

One female collected by A. W. Andrews, July 26, 1914.

**COLEOCENTRUS HARRINGTONI** Cushman, new name.

*Coleocentrus canadensis* HARRINGTON, Can. Ent., vol. 25, 1892, p. 29, female. [Not (*Acoenites*) *Coleocentrus canadensis* (Provancher) 1880]. *Type*.—Coll. Harrington, Ottawa, Canada. Good condition.

Discussion based on notes from type by Mr. Rohwer and two other females.

The specific name *canadensis* is preoccupied in *Coleocentrus* by *canadensis* Provancher, described in *Acoenites* and here synonymized with *flavipes* Provancher. Two females in the United States National Museum agree with Harrington's description and, according to Mr. Rohwer, who has seen the type, are Harrington's species.

Very similar in general form and color to *niger* Cushman, but larger and with an areolet; face punctured, barely half as long as wide; temples broad, scarcely sloping; lateral ocelli scarcely more than half as wide as ocellular line; thorax more strongly sculptured; propodeum relatively longer, all carinae prominent, spiracle long oval; first tergite nearly twice as long as wide; ovipositor nearly as long as body.

The two specimens are 25 and 22 mm. long, with the ovipositor about 4 mm. shorter.

This species is closely allied to the genotype, *Coleocentrus excitator* Gravenhorst, which, however, has the apical carina of the propodeum incomplete medially and the coxae black.

Neither of the United States National Museum specimens is labeled.

**COLEOCENTRUS OCCIDENTALIS** Cresson.

*Coleocentrus occidentalis* CRESSON, Proc. Acad. Nat. Sci. Phila., 1878, p. 376, female. *Type*.—Acad. Nat. Sci. Phila., No. 1431.

Discussion based on type, homotype, four other females, and eight males.

In general form and structure much like *harringtoni* Cushman and differing principally in color. Compared with *harringtoni* differs as follows: Face two-thirds as long as wide; ocelli larger, diameter of lateral ocellus two-thirds as long as ocellular line; black with the

abdomen in the female largely red in the middle, in the male more or less so; coxae more or less black or piceous at least at base; palpi, clypeus, face at sides and below antennae, scape and pedicel beneath, tegulae, and legs reddish, hind tibiae fuscous at apex, tarsi yellowish.

The male differs from the female principally in color, the red of the abdomen being confined largely to the sutures and the sides of

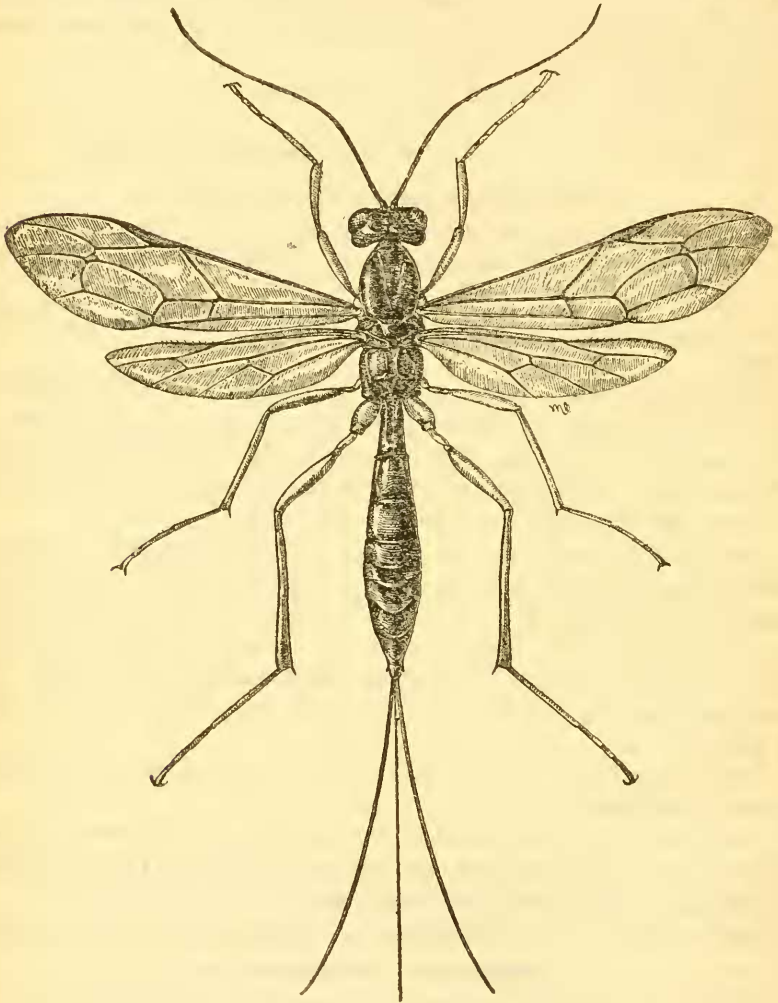


FIG. 2.—*COLEOCENTRUS OCCIDENTALIS* CRESSON. ADULT FEMALE ENLARGED ABOUT 3 DIAMETERS.

tergites 2 and 3, the entire yellow face and the paler appendages, the hind coxae, however, being frequently entirely black or piceous, though occasionally largely testaceous.

The normal size of this species is in the neighborhood of 25 mm., but one of the females, taken by W. M. Mann on San Juan Island, Washington, is only 17 mm. long.



Represented in the United States National Museum by five females (one a homotype by Mr. Rohwer) and eight males, all from the Northwest, ranging through Vancouver, Washington, Oregon, and Idaho.

The only biological data consists in a note on one of the females labeled "Hopkins U. S. No. 1061," which was taken on a dead hemlock log, August 26, 1902, at Junction, Washington, by A. D. Hopkins.

**COLEOCENTRUS QUEBECENSIS** Provancher.

*Coleocentrus quebecensis* PROVANCHER, Nat. Can., vol. 6, 1874, p. 79, female.

Discussion based on original description.

Provancher himself reduced this species to synonymy with *pettitii* Cresson. But his description differs from that species by the characters used in the above table to species. In his examination of Provancher's types, Mr. Rohwer was unable to find a specimen labeled *quebecensis*, but did find one labeled *pettitii*. Concerning his findings he wrote the following note:

Type not in Public Museum, Quebec, unless it is a specimen labeled as *pettitii* Cresson. *C. pettitii* of Provancher is *pettitii* of Cushman's manuscript table.

The humeral red spot, unless merely a not fully colored area, is very unusual for the genus.

**COLEOCENTRUS PETTITII** Cresson.

*Coleocentrus pettitii* CRESSON, Can. Ent., vol. 1, 1868, p. 35, female. *Type*.—Acad. Nat. Sci. Phila., No. 1430.

Discussion based on type, homotype, and one other female.

The strongly contrasting black body and coxae and pale red legs makes this species very readily recognizable.

Compared with *niger* Cushman, the homotype differs, in addition to the characters used in the key, as follows: Head polished; face finely punctured; temples convex, rather broad; diameter of lateral ocellus little more than half as long as ocellular line; petiolar area of propodeum not especially short, longitudinal carinae strong, spiracle long oval; abdomen more polished; first tergite barely half as wide as long, and less than a half longer than second; hypopygidium much less than half as long as abdomen; ovipositor three-fourths as long as body.

Head, thorax, abdomen, and all coxae black; clypeus, tegulae, venter, and narrow apical margins of tergites piceous; legs pale red, hind tibiae fuscous, especially above and at apex, their tarsi yellow.

In size very similar to *niger*. Labeled: "North Mt., Pa., 6. 9."

The other specimen is somewhat smaller, but otherwise very similar. It was taken at Kentville, Nova Scotia, June 29, 1916.

There is a male in the collection of the Academy of Natural Sciences of Philadelphia. It is labeled by Davis with a manuscript

name and referred to the genus *Xenoschesis* Foerster. It has the second and third tergites piceous laterally, the face and clypeus yellow, and front and middle coxae piceous in front, but is otherwise very similar to the female.

In the United States National Museum collection is a male from the same locality and captured on the same date as the homotype, which I believe to be an abnormally colored specimen of this species. It has the front and middle legs, except posterior side of femora, the hind coxae in front and their trochanters, the tegulae, face, clypeus, and scape below yellow; the hind coxae, and front and middle femora, except as noted, and the hind femora are testaceous. In structure it is exactly what the male of *pettitii* should be.

**COLEOCENTRUS MANNI** Cushman, new species.

Related to *pettitii* Cresson, from which, in addition to the key characters, it differs principally as follows:

*Female*.—Length, 15 mm.; antennae, 10 mm.; ovipositor, 10 mm. Face practically impunctate, polished; propodeum barely three-fourths as long as combined height of propodeum and metapleurum, spiracle distant by its length from pleural carina (in *pettitii* it is distinctly closer to the carina); first tergite fully half as wide at apex as long; nervulus nearly perpendicular and nearly interstitial (in *pettitii* it is strongly oblique and distinctly postfurcal); subdiscoideus but little below middle of apex of second discoidal cell.

*Male*.—Length, 13 mm.; antennae, 12 mm. Differs from female in having face, clypeus, scape below, palpi, tegulae (at least basally) yellow; legs generally paler, with front and middle coxae in front at apex, all trochanters in front, front and middle femora at apex and their tibiae in front yellow, hind tibiae and femora more contracting in color; second to fourth tergites laterally and their sternites more or less reddish. In the venational characters, except that of the areolet, the male shows gradation toward *pettitii*.

*Type locality*.—Orens Island, Washington.

*Other locality*.—Blue Mountains, Washington.

*Type*.—Cat. No. 22102, U.S.N.M.

Described from one female and two males, the female captured July 14–30, 1909, by W. M. Mann, and the males July 15, 1896, by C. V. Piper.

**COLEOCENTRUS PULCHRIPENNIS** Cushman, new species.

*Female*.—Length, 22 mm.; antennae, 15 mm.; ovipositor, 17 mm.

Differs from all the other North American species in its very dark wings.

Head subpolished, sparsely punctate, except on face where punctation is rather dense, and lower posterior orbits, where it is impunc-

tate; clypeus rather sharply inflexed, the median tooth broad and obtuse; malar space three-fourths as long as basal width of mandible; face two-thirds as long as wide; frons deeply concave, arcuately rugose; temples convex, rather sharply sloping; diameter of lateral ocellus slightly shorter than postocellar line and two-thirds as long as ocellular line. Thorax coriaceous, the sculpture a mixture of irregular rugosity and punctuation; propodeum much shorter than height of combined propodeum and metapleura, carinae rather strong, petiolar area rather long, spiracle long oval. Abdomen three-fourths longer than head and thorax combined; first tergite hardly half as wide as long, about a third longer than second; hypopygidium about half as long as abdomen.

Rufous; face uniformly slightly paler; mandibles and clypeal tooth piceous; occiput, frons, vortex, and superior orbits black; antennae blackish, scape, pedicel, and first flagellar joint red beneath; scutellum and tegulae slightly more yellowish; legs testaceous, tarsi and front and middle tibiae yellowish; wings dark brownish with purple reflections; membranous portion of tergites dark brown; ovipositor sheaths black.

*Type locality*.—Tuolumne County, California.

*Type*.—Cat. No. 21194, U.S.N.M.

One female collected by D. W. Coquillet.

COLEOCENTRUS RUFUS Provancher.

*Coleocentrus rufus* PROVANCHER, Nat. Can., vol. 8, 1876, p. 316, female. *Type*.—Prov. 1877 coll., Public Museum, Quebec; yellow label 456.

One female in the United States National Museum agrees perfectly with Provancher's description, and Mr. Rohwer, who has seen the type, is of the opinion that the determination is correct.

Related to *pulchripennis* Cushman, differing principally as follows: Head polished, impunctate; frons very shallowly concave, rugosity weak; temples strongly convex, broad, and weakly sloping; diameter of lateral ocellus equal to postocellar line and fully three-fourths as long as ocellular line; propodeal carinae sharp; spiracle nearly round; first tergite much more than half as wide as long, nearly a half longer than second; ovipositor much shorter, the measurements being—body, 20 mm.; ovipositor, 12 mm.

Colored like *pulchripennis* except as follows: Face yellow with a median oval red spot; clypeus reddish at base, yellowish at apex, the tooth red; mandibles piceous only at apex; cheeks piceous; black of top of head confined to frontal spot from ocelli to antennae, occiput and posterior portion of vertex and upper orbits, space between ocelli red; thoracic sutures and extreme base of first tergite black; tegulae distinctly yellow; front and middle knees pale; hind tibiae



infusate especially apically, their tarsi lemon yellow; wings subhyaline; membranous portion of tergites yellowish.

Taken at Whitefish Point, Michigan, July 4, 1913, by A. W. Andrew.

**COLEOCENTRUS SIMLIIS** Cushman, new species.

*Female*.—Length, 15 mm.; antennae, 10 mm.; ovipositor, 9 mm.

Related to *rufus* Provancher, but easily distinguished from that species by the characters used in the table. It differs further in the yellow clypeus; red temples; paler front and middle tibiae and tarsi, these being yellow; more or less black or piceous inner surfaces of hind coxae; narrower temples; weaker propodeal carinae; and longer propodeum, this being fully three-fourths as long as combined height of propodeum and metapleura; otherwise much like *rufus*.

*Male*.—Length, 15 mm.; antennae (broken). Head and thoracic structure much as in female, the latter more slender; malar space barely half as long as basal width of mandible, temples broader, nearly straight; ocelli slightly larger; propodeum nearly as long as combined height of propodeum and metapleura; first tergite less than a third as wide as long, its spiracles prominent, others parallel sided; face, clypeus, scape, and pedicel below, and a narrow orbital line opposite antennae pale lemon yellow, as are also entire front and middle legs except posterior side of femora and coxae.

*Type locality*.—Montgomery County, Pennsylvania.

*Other localities*.—Dead Run, Fairfax County, Virginia; Glencarlynn, Virginia; Inglenook, Pennsylvania; Forest Glen, Maryland.

*Type*.—Cat. No. 21195, U.S.N.M.

Described from five females and one male, the type and allotype from the type locality, paratype *a* from Dead Run, Virginia. (R. C. Shannon); paratype *b* from Glencarlynn, Virginia. (N. Banks) paratype *c* from Inglenook, Pennsylvania. (W. S. Fisher); and paratype *d* from Forest Glen, Maryland. (F. Knab).

Except for their generally darker color paratypes *a*, *b*, and *d* are practically typical. Paratype *c* is considerably larger, generally darker, and has the first tergite relatively wider than in the type.

**SPECIES ERRONEOUSLY REFERRED TO COLEOCENTRUS.**

*Lampronota edwardsii* CRESSON, Proc. Acad. Nat. Sci. Phila., 1878, p. 379, female.

Synonymized by Dalla Torre with *Collocentrus rufus* Provancher. Synonymy wrong. It is a Lissonotine.

*Coleocentrus texanus* ASHMEAD, Proc. U. S. Nat. Mus., vol. 12, 1889, p. 144.

Later referred by Ashmead to the Cryptine genus *Nematopodius* Foerster, but is the genotype of the Cryptine genus *Derocentrus* Cushman.<sup>1</sup>

<sup>1</sup> Proc. Ent. Soc. Wash., vol. 21, 1919, p. 113.



Genus *AROTES* Gravenhorst.

*Arotes* GRAVENHORST, Ich. Eur., vol. 3, 1829, p. 446. *Genotype*.—*Arotes albicinctus* Gravenhorst (Monobasic).

*Sphalerus* KRIECHBAUMER, Ent. Nachr., vol. 4, 1878, p. 41. *Genotype*.—(*Sphalerus bifasciatus* Kriechbaumer)=*Arotes albicinctus* Gravenhorst (Monobasic).

Although the genus *Arotes* is very easily distinguished from the allied genera it has not been entirely understood by American authors as is evidenced by the fact that although Cresson<sup>1</sup> tabulated the species in 1869 he described a new species in 1870, referring it to *Aconeites*. By the distinctly petiolate abdomen with spiracle of the first tergite placed at about the middle the species of *Arotes* are easily distinguished from those of the other genera of this tribe.

*Generic characters*.—Clypeus flat or somewhat depressed basally, the apical margin truncate or slightly, shallowly emarginate; antennae long, slender; notauli complete, meeting before the anterior margin of scutellum; prepectal carina strong extending to or nearly to the top of the mesepisternum; sternauli wanting; propodeum short with nearly complete areolation, the spiracle elongate and placed at about the middle; legs long, slender or the hind femora somewhat more robust; claws long, curved and toothed within; abdomen petiolate, the first tergite fully three times as long as apical width, the spiracles placed at about the middle; ovipositor longer than abdomen; areolet wanting; recurrent antefurcal or interstitial; nervellus slightly reclivous or perpendicular, broken at about the middle. Species either uniformly pale or black with yellowish marks.

In the key to the American species published by Cresson the position of the recurrent vein in relation to the intercubitus was considered of specific value, but the additional material has proven that this character is subject to individual variation. The areolation of the propodeum is also variable and not of specific value. Color is fairly constant and when used with care offers the best means of distinguishing the species.

## KEY TO THE SPECIES.

1. Body largely ferruginous, first tergite and mesepisternum entirely so; small species.....2.
- Body black or black and yellow; first tergite and the mesoscutum always with black; larger species.....3.
2. Stigma black; apical margins of the wings dusky antennae with a yellow band  
*melleus* (Say).
- Stigma ferruginous; wings unicolorous, hyaline; antennae uniformly rufous  
*rupinsulensis* (Cresson).
3. Posterior orbits, most of the thorax and propodeum black.....*maurus* Rohwer.
- Posterior orbits, many marks on thorax and propodeum yellowish.....4.

<sup>1</sup> Trans. Amer. Ent. Soc., vol. 2, p. 260.

4. Hind femora rufous tipped with black; hind coxae black with a white spot above and below.....*decorus* (Say).  
 Hind femora mostly black.....5.  
 Hind femora entirely ferrugineous.....6.
5. Dusky spot surrounding base of radius; cheeks seen from in front full and rounded; mesepisternum of female black.....*formosus* Cresson.  
 No dusky spot below stigma; cheeks seen from in front straight, sloping; mesepisternum marked with yellow in both sexes.....*amoenus* Cresson.
6. Females.....7.  
 Males.....8.
7. Stigma largely yellowish; vertex, and mesoscutum black; apical tergites largely black and contrasting sharply with the yellow hypopygidium.*occipitalis* Cresson.  
 Stigma black; vertex and mesoscutum largely rufous; apical tergites largely yellowish ferruginous, the hypopygidium the same color.....*vicinus* Cresson.
8. Stigma largely yellowish; base and apex of first tergite yellow; mesepisternum entirely or almost entirely yellow.....*occipitalis* Cresson.  
 Stigma black; first tergite yellow apically the base black; mesepisternum black.  
*vicinus* Cresson.

AROTES MELLEUS (Say).

*Acoenites mellus* SAY, Boston Journ. Nat. Hist., vol. 1, 1835, p. 249.—LECONTE, Edition of Say, vol. 2, 1859, p. 703

Type lost, discussion based on a single neotype.

*Female*.—Length, 9 mm.; length of ovipositor, 8 mm. Face with a few dorsad-ventrad striae centrally, laterally transversely striato-punctate; frons, vertex, and temples without punctures; scutum without punctures; notouli not foveolate; suture in front of scutellum with a few rugae; areola and basal area confluent, the former poorly defined the latter parallel-sided; propodeum almost without sculpture; mesepisternum shining with widely separated, distinct punctures; nervulus antefurcal by about half its length; recurrent distinctly antefurcal. Ferruginous; face, scape beneath and scutellum and metascutellum yellow; a large frontal spot and some sutures of thorax blackish; legs ferruginous, tibiae and tarsi rather paler; antennae brownish with a broad yellow annulus; wings hyaline with the apical margin dusky; venation including stigma dark brown.

Say's specimen came from Indiana; the specimen described above was collected at Delaware Water Gap, New Jersey, July 8.

The neotype differs from Say's description only in the color of the antennae. The original description says: "Antennae white; basal two-thirds above black." It may be that the apical joints of the antennae were wanting in the specimen examined by Say or it is possible that the color of the antennae may vary.

AROTES RUPINSULENSIS (Cresson).

*Acoenites rupinsulensis* CRESSON, Trans. Amer. Ent. Soc., vol. 3, 1870, p. 143.—WALSH, Trans. Acad. Sci. St. Louis, vol. 3, 1873, p. 152.

Type, a single female, Cat. No. 2049, Acad. Nat. Sci., Philadelphia.

Besides the characters given in the above key this species may be distinguished from *melleus* by having the scutellum concolorous with

the rest of the thorax; nervulus antefurcal by only twice its width; areola defined laterally; face with distinct punctures which dorsally have a tendency to transverse striato-punctuation.

Walsh lists three females and one male, and says the terminal edge of the wings is clouded with dusky. His specimens are lost, so it is impossible to say that they are the same as the Cresson type.

Both the type and the specimens listed by Walsh were collected in Illinois.

**AROTES MAURUS** Rohwer, new species.

This new species is probably more closely allied to *formosus* Cresson than to any other described form, but the much darker head and thorax readily distinguishes it from that.

*Female*.—Length, 18 mm.; length of ovipositor, 18 mm. Clypeus depressed basally; face with a median dorsad-ventrad raised line, irregularly wrinkled on each side of this line, shining and with well separated distinct punctures laterally; frons, vertex, and temples smooth, without sculpture; ocelli in a low triangle; the postocellar line one-third shorter than the ocellocular line; scutum polished; notauli feebly foveolate; suture in front of the scutellum with many rugae; ridges on propodeum strong; basal area wider than long; parallel-sided, separated from the areola; areola and petiolar areas confluent; mesepisternum with a distinct episternal depression which is polished, impunctate, rest of episternum shining, with distinct punctures; sides of propodeum confluent punctate; recurrent interstitial in one wing, distinctly antefurcal in other. Black; band on apical margin of clypeus confluent with narrow line (dentate opposite antennae) from near top of eye, spot on cheeks, tegulae, scutellum and metascutellum, and apical margins of first, second, and third (interrupted medianly and laterally on third) tergites *reddish yellow*; legs black; apex of anterior coxae, spot on intermediate coxae, trochanters, anterior and intermediate femora beneath, four anterior tibiae and tarsi, basal half of posterior tibiae and posterior tarsi *yellowish*; antennae black, with a broad yellowish annulus beyond the middle; wings hyaline, slightly yellowish with the apical margin dusky; venation, including stigma, dark brown.

In the paratype the areola and petiolar area are distinctly separated and the yellow line on inner eye margins is interrupted below.

*Type locality*.—Mission, British Columbia. Described from two females.

*Type*.—Cat. No. 22173, U.S.N.M.

**AROTES DECORUS** (Say).

*Acoenitus decorus* SAY, Boston Journ. Nat. Hist., vol. 1, pt. 3, 1836, p. 248.—

LECONTE, Edition of Say, vol. 2, 1859, p. 702.

*Arotes decorus* CRESSON, Trans. Amer. Ent. Soc., vol. 4, 1872, p. 164.

Type lost, neotype a female in the collection in the Academy of Natural Sciences, Philadelphia, bearing name label in Cresson writing and considered as "proxytype" by Viereck.

The color of the hind femora makes this species easily recognized. In the specimens examined the recurrent is always antefurcal and the areolation of the propodeum is fairly constant. Basal area nearly parallel-sided, its length and width subequal; areola separated

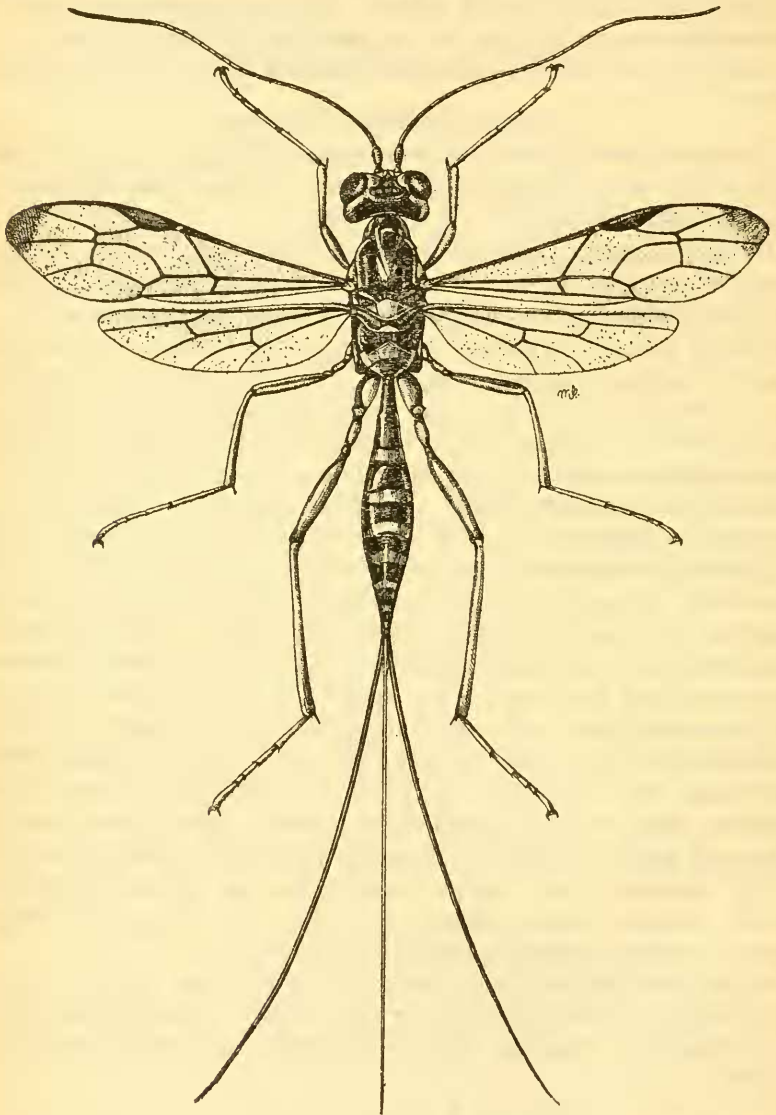


FIG. 3.—*AROTES DECORUS* (SAY). ADULT FEMALE ENLARGED ABOUT 3.5 DIAMETERS.

from both the basal and petiolar areas; ovipositor subequal in length with the body; wings hyaline with apical margin dusky; stigma black; antennae with a broad white annulus.

*Distribution.*—Say's specimens came from Indiana, and specimens in the collection of the Academy of Natural Sciences of Philadelphia



come from Virginia and Georgia. The national collection contains specimens from Cadet, Missouri; Milwaukee County, Wisconsin; Harrisburg and Linglestown, Pennsylvania (W. S. Fisher).

*Hosts.*—Felt<sup>1</sup> records this species as a parasite of *Xylotrechus colonus* Fabricius, and W. S. Fisher has reared it as a parasite of *Tomoxia bidentata* Say.

**AROTES FORMOSUS** Cresson.

*Arotes formosus* CRESSON, Can. Ent., vol. 1, 1868, p. 34.

Type a single male. Cat. No. 1435, Acad. Nat. Sci., Philadelphia.

This species although closely allied to *amoenus* is easily distinguished by the characters mentioned in the above key. Recurrent interstitial; ovipositor subequal in length with the body; wings hyaline with apical margin dusky; stigma black; notauli foveolate; antennae with a broad annulus.

Cresson's type came from Ottawa, Canada; there are two females from Massachusetts in the Academy of Natural Sciences of Philadelphia; and the National Collection has females from Sherbrook, Canada, and Floodwood, Schoolcraft County, Michigan (F. M. Gaige); and males from Clark's Valley, Dauphin, Pennsylvania, collected June 5, 1919, by Kirk and Champlain.

**AROTES AMOENUS** Cresson.

*Arotes amoenus* CRESSON, Can. Ent., vol. 1, 1868, p. 34.

*Tropistes elegans* PROVANCHER, Nat. Can., vol. 6, 1874, p. 80.

Type of *amoenus* Cat. No. 1434, Academy of Natural Sciences, Philadelphia. Type of *elegans* either lost or in Public Museum of Quebec under name label *amoenus*.

This is the commonest species of *Arotes* occurring in our fauna. The position of the recurrent in relation to the intercubitus is subject to considerable variation. It is often different in the two wings of the same specimen and varies from antefurcal by the length of the intercubitus to interstitial. The areolation of the propodeum is also subject to considerable variation, as the areola and basal area may each be either longer than wide or wider than long, and all intermediate conditions exist. The color is, however, fairly constant and the species should easily be recognized by the above key.

*Distribution.*—Specimens in the collection of the Academy of Natural Science of Philadelphia come from Canada, Virginia, Massachusetts, and Pennsylvania, while the National Collection contains specimens from the following localities: Sherbrook, Canada; Capens, Maine; Durham, New Hampshire (Weed and Fiske); east Massachusetts; Savoy, Massachusetts (W. E. Britton); Nassau (Bowditch), East River (C. R. Ely), Connecticut; New York; Pennsylvania; Castle Rock and Overbrook (G. M. Greene), Pennsylvania; Laurel (E. B.

<sup>1</sup>Forest and Shade Tree Insects of New York, vol. 1, 1905, p. 261.

Marshall), College Park (F. Knab), Maryland; Dead Run, Fairfax County, Virginia (Shannon); Black Mountains, North Carolina (N. Banks); Milwaukee County, Wisconsin; Texas (Belfrage).

AROTES VICINUS Cresson.

*Arotes vicinus* CRESSON, Trans. Amer. Ent. Soc., vol. 2, 1869, p. 260.

*Arotes venustus* CRESSON, Trans. Amer. Ent. Soc., vol. 2, 1869, p. 260.

*Arotes superbis* PROVANCHER, Nat. Can., vol. 6, 1874, p. 81.

Type of *vicinus*, one male, Cat. No. 1432, Academy of Natural Sciences, Philadelphia. Type of *venustus*, two females (one type), Cat. No. 1433, Academy of Natural Sciences, Philadelphia. Type of *superbus*, not located, but probably in Public Museum, Quebec, unlabeled, under the name *vicinus*.

In describing *vicinus* Cresson did not specify the sex or number of specimens, but it is certain that he had only the male, and in the collection of the Academy of Natural Sciences in Philadelphia there is one male which was made lectotype by Cresson. This male is the opposite sex of the species described as *venustus*. The male originally associated with *venustus* represents a different species and should be known as *occiputalis*, a name suggested by Cresson.

Robust; ovipositor distinctly longer than the abdomen, but shorter than thorax and abdomen; recurrent usually interstitial, but in some specimens antefurcal; hind coxae rufous, with bases and apices black or black with rufous spots; wings subhyaline with the usual apical spot.

*Distribution*.—Massachusetts (Cresson); Quebec, Canada (Provancher); New York; Munsing, Michigan (H. B. Morris); Whitefish Point, Michigan (A. W. Andrews); Inglenook, Pennsylvania (Craighead); Brettell Mills, South Dakota (Hopkins); Falls Church, Virginia (Kirk).

*Hosts*.—Reared as a parasite of *Leptura vittata* by F. C. Craighead and from a pine stump containing *Leptura rubrica* and *L. vagans* by H. B. Kirk.

AROTES OCCIPUTALIS Cresson.

*Arotes occiputalis* CRESSON, Trans. Amer. Ent. Soc., vol. 2, 1869, p. 260.

*Arotes apicatus* DAVIS, Trans. Amer. Ent. Soc., vol. 24, 1879, p. 366.

Type of *occiputalis*, two males (one type), Cat. No. 4001, Academy Natural Sciences, Philadelphia. Type of *apicatus*, one female, Cat. No. 164, Academy Natural Sciences, Philadelphia.

In describing *venustus* Cresson expressed a doubt as to the correct association of the male and suggested that the male he described was possibly "a distinct species, in which case it may be named *occiputalis*." The name *occiputalis* has therefore been omitted from most of the catalogues. The female described by Davis as *apicatus* is undoubtedly the female of *occiputalis*.

Rather slender; ovipositor shorter than the thorax and abdomen; hind coxae of female rufous to black; face of female usually black with orbital lines and a small central spot, but occasionally entirely yellow; mesepisternum usually black in female, but in one specimen with a yellow band; propodeum in female black, with the posterior face yellow; thorax of male largely yellow; recurrent interstitial or antefurcal.

*Distribution.*—West Virginia (Cresson); Michigan (Davis); Delaware Water Gap, New Jersey; Jackson's (P. R. Myers), Cabin John Bridge (R. M. Fouts), Maryland; Great Falls (H. L. Viereck), Falls Church (Wm. Middleton), Springfield (T. E. Snyder), Virginia.

*Host.*—Reared as a larval parasite of *Strangalia bicolor* by T. E. Snyder.

#### GENERA NOT REPRESENTED IN NORTH AMERICAN FAUNA.

Apparently the three genera, *Mesoclistus* Foerster, *Acoenites* Latreille, and *Phaenolobus* Foerster, have not been discovered in North America. Specimens of the genotypes of all of these are in the National Museum collection and have been used in devising the key to genera. The features mentioned in the key are apparently so characteristic that further discussion of the genera individually is not necessary.

*Chorischizus* Foerster was synonymized by Roman<sup>1</sup> with *Phaenolobus* Foerster, in which he was undoubtedly correct. The only character by which these have been separated is the possession or lack of the ramulus—a character of not more than specific value. We have examined specimens of the genotypes of both genera and find no differences of generic value.

Apparently nothing is known of the host relations of *Mesoclistus* and *Acoenites*, and there is only one record referring to the host of *Phaenolobus*. Brischke recorded *Phaenolobus arator* (Rossi) as a parasite of *Sesia formicaeformis* Esper.

No North American species has ever been referred to *Mesoclistus* or *Phaenolobus*, but several have been described in *Acoenites*. These are listed below and their proper systematic position is indicated.

#### SPECIES ERRONEOUSLY REFERRED TO ACOENITES.

*Acoenites canadensis* PROVANCHER, Nat. Can., vol. 12, 1880, p. 10, male.

*Acoenites flavipes* PROVANCHER, Nat. Can., vol. 6, 1874, p. 80, female.

Mr. Rohwer has examined the types of the above two species. He pronounces them to be species of *Coleocentrus*, and *canadensis* to be the male of *flavipes*. The two species are thus treated on page 507 of this paper.

*Acoenites decorus* SAY, Bost. Journ. Nat. Hist., vol. 1, 1836, p. 248, male and female.

Referred by Cresson<sup>2</sup> to *Arotus* (see p. 517).

<sup>1</sup> Ent. Tidsk., 1910, p. 184.

<sup>2</sup> Trans. Amer. Ent. Soc., vol. 4, 1872, p. 164.

*Aeoenites melleus* SAY, Bost. Journ. Nat. Hist., vol. 1, 1836, p. 249, female.

This is an *Arotos*, (see p. 516).

*Aeoenites rupinsulinsis* CRESSON, Trans. Amer. Ent. Soc., vol. 3, 1870, p. 143; WALSH, Trans. St. Louis Acad. Sci., 1873, p. 152.

This is also an *Arotos*, (see p. 516).

*Aeoenites stigmatopus* SAY, Keating's Narrat. Exped., vol. 2, 1824, App. p. 325, female.

Walsh referred this to *Xylonomus*. It more properly belongs to *Xorides*.<sup>1</sup>

HOST CATALOGUE.

Cerambycid in *Viburnum*.

*Coleocentrus minor* Cushman.

*Leptura rubrica* Say or *Leptura vagans* Olivier.

*Arotos vicinus* Cresson.

*Leptura vittata* Germar.

*Arotos vicinus* Cresson.

*Sesia formicaeformis* Esper.

*Phaenolobus arator* (Rossi).

*Strangalia bicolor* Swederus.

*Arotos occiputalis* Cresson.

*Tomoxia bidentata* Say.

*Arotos decorus* (Say).

*Xylotrechus colonus* Fabricius.

*Arotos decorus* (Say).

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<sup>1</sup> See Proc. U. S. Nat. Mus., vol. 57, 1920, p. 444.



## INDEX.

This index includes the names of all the genera and species treated in this paper. Accepted genera are in bold face type; synonyms in italics; valid species in Roman.

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